“Placement assurance for all, Minimum 50 learners get 100% Placement or Full fee refund.”

“ IITians-Founded Coder Pathshala ”

Expert **Data Analytics** career support with **IIT alumni** and top professionals from **Google, Reliance-Jio**, **IISc-Bangalore** & leading research institutes.

Programming in C (Semester 1)

Module 1: Introduction to Programming & C Basics

- Problem-solving techniques
- Algorithms and flowcharts
- Structure of a C program
- Compilation and execution process

Module 2: Data Types & Operators

- Variables and constants
- Data types and type conversion
- Arithmetic, relational, logical operators
- Expressions and precedence

Module 3: Control Structures

- Conditional statements
- Looping constructs
- Nested loops
- Break and continue

Module 4: Arrays & Strings

- One-dimensional and two-dimensional arrays
- Character arrays and string functions
- Array applications

Module 5: Functions & Pointers

- Function declaration and definition
- Call by value and call by reference
- Pointer basics and pointer arithmetic
- Dynamic memory allocation

Module 6: Structures & File Handling

- Structures and unions
- File operations
- Command-line arguments
- Simple applications

Python Programming (Semester 1)

Module 1: Python Fundamentals

- Introduction to Python
- Syntax and indentation
- Variables and input/output

Module 2: Control Flow & Functions

- Conditional statements
- Loops
- Functions and parameters

Module 3: Python Data Structures

- Lists and tuples
- Sets and dictionaries
- Data manipulation techniques

Module 4: Strings, Files & Exceptions

- String operations and formatting
- File read/write
- Exception handling

Module 5: Modules & Libraries

- Importing modules
- Standard libraries
- Introduction to NumPy

Module 6: Problem Solving with Python

- Algorithmic thinking
- Logical problem solving
- Mini-project using Python

Object Oriented Programming using C++ (Semester 2)

Module 1: C++ Fundamentals

- C vs C++
- Program structure
- Input/output streams

Module 2: Classes & Objects

- Class definition
- Objects and access specifiers
- Constructors and destructors

Module 3: Inheritance

- Types of inheritance
- Method overriding
- Virtual base classes

Module 4: Polymorphism

- Function overloading
- Operator overloading
- Virtual functions

Module 5: Templates & STL

- Function and class templates
- STL containers
- Iterators and algorithms

Module 6: Exception & File Handling

- Exception handling mechanism
- File input/output
- Applications

Programming in Java (Semester 2)

Module 1: Java Basics & JVM

- Java features
- JVM, JDK, JRE
- Java program structure

Module 2: OOP Concepts in Java

- Classes and objects
- Constructors
- Inheritance

Module 3: Polymorphism & Abstraction

- Method overriding
- Abstract classes
- Interfaces

Module 4: Packages & Exception Handling

- Built-in packages
- User-defined packages
- Exception hierarchy

Module 5: Multithreading

- Thread lifecycle
- Synchronization
- Inter-thread communication

Module 6: File Handling & Collections

- File I/O streams
- Serialization
- Java Collection Framework

Semester 3 – Python, Data Handling & EDA for AI

Lay the foundation for your AI journey by mastering Python programming, essential data handling techniques, and robust exploratory data analysis (EDA).

Module 1: Introduction to Data Science & AI

- Data science overview
- AI vs ML concepts
- Analytics lifecycle
- Types of AI
- Industry use cases

Module 2: Python for Data Science

- Python syntax & data types
- Control flow & functions
- Coding fundamentals
- Basic programming constructs
- Problem-solving with Python

Module 3: Python Data Structures

- Lists & tuples for ordered data
- Dictionaries & sets for unique data
- String operations & formatting
- Comprehensions for concise code
- Efficient data manipulation

Module 4: NumPy Fundamentals

- Arrays & vectors for numerical data
- Indexing & slicing for data access
- Broadcasting for array operations
- Vectorization for performance
- Numerical computing essentials

Module 5: Pandas for Data Handling

- DataFrames & Series structures
- Importing/exporting various data formats
- Filtering & selection techniques
- Comprehensive data inspection
- Powerful data transformations

Module 6: Data Cleaning & Transformation

- Handling missing values effectively
- Detecting & removing duplicates
- Strategies for outlier treatment
- Feature preparation for modeling
- Advanced data reshaping techniques

Module 7: Data Visualization

- Matplotlib basics for static plots
- Seaborn for statistical visualizations
- Distribution visuals for insights
- Correlation heatmaps for relationships
- Storytelling with compelling visuals

Module 8: Exploratory Data Analysis (EDA)

- Univariate analysis for single variables
- Bivariate analysis for variable relationships
- Advanced pattern detection
- In-depth correlation analysis
- Comprehensive EDA reporting

Module 9: Statistics Foundations

- Mean & median for central tendency
- Variance & standard deviation
- Understanding Z-scores
- Descriptive statistics principles
- Effective data summarization

Semester 4 – Applied Statistics & Supervised ML

Deepen your understanding of statistical principles and master supervised machine learning techniques crucial for predictive modeling.

Module 10: Probability Fundamentals

- Probability rules
- Random variables
- Common distributions
- Law of large numbers
- Statistical intuition

Module 11: Hypothesis Testing

- Null hypothesis
- p-values
- t-tests
- Chi-square test
- Statistical decisions

Module 12: Correlation & ANOVA

- Pearson correlation
- Spearman correlation
- ANOVA basics
- Relationship analysis
- Statistical inference

Module 13: Linear Regression

- Simple regression
- Coefficients
- R^2 score
- Model interpretation
- Prediction analysis

Module 14: Multiple Regression

- Multivariate models
- Residual analysis
- Multicollinearity
- Overfitting concepts
- Model diagnostics

Module 15: Logistic Regression

- Classification basics
- Sigmoid function
- Confusion matrix
- Precision & recall
- Binary prediction

Module 16: Decision Trees

- Tree structure
- Gini & entropy
- Splitting criteria
- Pruning concepts
- Interpretability

Module 17: Ensemble Learning

- Bagging methods
- Random Forest
- Boosting basics
- Feature importance
- Model improvement

Module 18: Model Validation & Tuning

- Train-test split
- Cross-validation
- GridSearchCV
- Hyperparameter tuning
- Model comparison

Semester 5 – Unsupervised Learning, NLP & Deep Learning Intro

Explore advanced machine learning techniques, natural language processing, and the foundations of deep learning to tackle complex data challenges.

Module 19: Feature Engineering

- Scaling & normalization
- Encoding techniques
- Handling skewness
- Feature selection
- Data preparation

Module 20: Clustering Techniques

- K-Means clustering
- Distance metrics
- Optimal cluster selection
- Customer segmentation
- Cluster evaluation

Module 21: Hierarchical Clustering

- Agglomerative clustering
- Divisive clustering
- Dendrograms
- Document clustering
- Cluster interpretation

Module 22: Dimensionality Reduction (PCA)

- PCA fundamentals
- Variance explained
- Feature reduction
- Visualization
- High-dimensional data

Module 23: Association Rule Learning

- Market basket analysis
- Apriori algorithm
- Support & confidence
- Lift metric
- Pattern mining

Module 24: Natural Language Processing

- Text preprocessing
- Tokenization
- Bag-of-Words
- TF-IDF
- Text features

Module 25: Sentiment Analysis

- Sentiment classification
- Text features
- ML-based approaches
- Evaluation metrics
- Real-world use cases

Module 26: Introduction to Deep Learning

- DL vs ML
- Artificial neurons
- Activation functions
- ANN architecture
- Learning process

Module 27: Training Neural Networks

- Forward propagation
- Backpropagation
- Gradient descent
- Loss functions
- Optimizers

Module 28: Convolutional Neural Networks (CNN)

- Convolution layers
- Pooling layers
- Feature extraction
- Image classification
- CNN intuition

Semester 6 – Advanced Deep Learning, Deployment & Capstone

Conclude your journey by mastering cutting-edge deep learning, deploying models to production, and delivering an impactful capstone project.

Module 29: Advanced Deep Learning

- Deep architectures
- Vanishing gradients
- Advanced optimizers
- Model stability
- Performance tuning

Module 30: CNN Architectures & Transfer Learning

- VGG & ResNet
- Pre-trained models
- Feature extraction
- Fine-tuning
- Image modeling

Module 31: Recurrent Neural Networks

- Sequential data
- RNN architecture
- LSTM fundamentals
- GRU basics
- Time-series modeling

Module 32: Generative AI

- Autoencoders
- Variational autoencoders
- GAN fundamentals
- Synthetic data
- Generative modeling

Module 33: Reinforcement Learning

- RL concepts
- Agent & environment
- Reward mechanisms
- Q-learning
- Decision optimization

Module 34: Model Deployment

- Model serialization
- Flask & FastAPI
- Cloud deployment
- Streamlit demos
- API-based inference

Module 35: AI Ethics & Responsible AI

- Bias & fairness
- Explainable AI
- Model interpretability
- Ethical challenges
- Governance principles

Module 36: Capstone Module

- End-to-end AI pipeline
- Data to deployment
- Model evaluation
- Real-world problem solving
- Final presentation